

END TERM 3 2026

GRADE 10

POWER MECHANICS

MARKING SCHEME

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MARKING PRINCIPLES

- Accept equivalent technically correct responses consistent with the attached Grade 10 Power Mechanics Curriculum Design.
- For constructions, award marks for correct method, construction accuracy and required final result/labels.
- For calculations, award method marks where the correct formula and substitution are shown.
- Accept correctly labelled technically accurate alternative sketches.

DETAILED MARKING SCHEME

Item	Expected answer / marking points	Allocation	Marks
1(a)	Power Mechanics is the study/learning area concerned with mechanical principles, systems and applications involving motor vehicles, engines, workshop practice and related technical drawing.	2	2
1(b)	Any two valid opportunities/careers: motor vehicle technician, mechanic, automotive engineer/technologist, workshop supervisor, technical trainer, etc.	1 each	2
1(c)	Any two: transport, vehicle maintenance, employment/enterprise, industrial development, mobility, repair services.	1 each	2
1(d)	Any two valid historical developments/trends in motor vehicle development.	1 each	2
2(a)	Any four: work area/benches; machine/workshop area; storage/store; office; tool area; wash/cleaning area; entrance/exit; safe walkways or other curriculum-supported areas.	1 each	4
2(b)	Any two: improves safety, workflow, accessibility, efficient use of space, reduces accidents/congestion, improves productivity.	1 each	2
2(c)	Any two: clearly marked pedestrian routes, safe exits, visible boundaries/signs, unobstructed walkways, hazard marking.	1 each	2
3(a)	Any three: keep workplace clean; use correct tools; follow instructions; isolate	1 each	3

	hazards; report faults; wear PPE; no horseplay; maintain safe housekeeping.		
3(b)	Any two: running/horseplay, careless tool use, working without PPE, unsafe handling of equipment, obstructing walkways.	1 each	2
3(c)	Any two PPE items with correct purposes, e.g. safety boots—protect feet; overalls—protect clothing/body; gloves—protect hands; goggles—protect eyes; ear protection—reduce noise exposure.	1 each item + purpose	2
4(a)	Prohibition—action not allowed; mandatory—required action; warning—hazard/danger; fire-equipment—location/use of fire-fighting equipment.	1 each	4
4(b)	Any three: handling chemicals, welding/grinding, working with sharp/hot parts, noisy operations, risk of flying particles, heavy mechanical work.	1 each	3
5(a)	A scale used to read small subdivisions accurately, such as units/subunits that cannot be read conveniently on a plain scale.	2	2
5(b)	Correct scale setup and representative fraction; division into main units; subdivision into smaller units; diagonal construction; accurate proportional markings and labelling.	5	5
5(c)	Any two: engineering drawings, maps/plans, machine/component drawings, workshop layout drawings.	1 each	2
6(a)	The path traced by a moving point under specified conditions.	2	2
6(b)	Any two: ellipse, cycloid, involute, parabola, hyperbola, locus of a mechanism point.	1 each	2
6(c)	Any four valid construction steps: identify mechanism/link positions; divide the motion into equal intervals; transfer successive positions; locate corresponding positions of P;	1 each	4

	join points smoothly; check continuity/accuracy.		
7(a)	Condition where a line/curve touches another curve at one point without crossing it locally.	2	2
7(b)	Any two valid methods, e.g. perpendicular from centre to tangent; construction from external point; tangent construction using auxiliary circle/standard geometric method.	1 each	2
7(c)	Join external point to centre; bisect the centre-to-point line; use midpoint as centre of auxiliary circle; intersect original circle; join external point to tangent point(s).	4	4
8(a)	Any three: provide traction; transmit driving/braking forces; absorb road irregularities; support vehicle load; provide steering/contact with road.	1 each	3
8(b)	Incorrect pressure changes contact area/handling, braking and stability and may cause abnormal wear or tyre failure.	2	2
8(c)	Any three: check pressure, inspect tread/wear, puncture repair, wheel alignment/balancing where appropriate, inspect for damage, maintain correct inflation.	1 each	3
9(a)	Any three: protect occupants; provide mounting/enclosure for components; improve structural integrity; provide aerodynamic/external enclosure; provide comfort/protection from environment.	1 each	3
9(b)	Any three: channel section, box section, I-section, tubular frame, ladder frame or another curriculum-supported section.	1 each	3
9(c)	Any three: crumple zones, strong passenger compartment, reinforced frame, impact-absorbing structures, seat-belt mounting structures, collapsible steering-related structures.	1 each	3
10(a)	Any four: bolting, riveting, welding, brazing, soldering,	1 each	4

	adhesive bonding, fastening.		
10(b)	Any two: bolts and nuts, screws, studs/nuts, other correct threaded fasteners.	1 each	2
10(c)	Any two: joins dissimilar materials, reduces heat distortion, seals joints, reduces vibration/noise, allows distributed load, useful for thin panels.	1 each	2
11(a)	A machine/device that converts energy into mechanical work/output.	2	2
11(b)	Bore—internal cylinder diameter; stroke—distance travelled by piston between limits; engine capacity—swept/working volume of engine cylinders, generally total displacement.	1 each	3
11(c)	$V = \pi d^2 L / 4 = \pi (8 \text{ cm})^2 (9 \text{ cm}) / 4 \approx 452.4 \text{ cm}^3$.	2	2
12(a)	Any three methods: combustion process, cylinder arrangement, fuel type, cooling method, operating characteristics/speed, number of cylinders, stroke cycle.	1 each	3
12(b)	External combustion: fuel combustion occurs outside the working cylinder/engine working fluid system; internal combustion: combustion occurs inside the engine cylinder/combustion chamber.	2	2
12(c)	Any one valid example: petrol/gasoline engine, diesel engine, or another curriculum-supported fuel classification example.	1	1
13(a)	Any four: piston, cylinder, connecting rod, crankshaft, camshaft, valves, cylinder head, rocker arms, crankcase or other named engine components in the curriculum.	1 each	4
13(b)	Crankshaft—converts reciprocating motion to rotary motion; camshaft—operates valves at correct timing; piston—moves in cylinder and transmits/receives force from combustion.	1 each	3

CURRICULUM COVERAGE MATRIX

Question	Curriculum sub-strand(s)	Assessed coverage
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1	1.1 Overview of Power Mechanics as a learning area; 1.2 Evolution of motor vehicles	Definition, careers/opportunities, contribution, historical development
2	1.3 Power mechanics workshop layout	Workshop areas, layout, floor markings, safety
3	1.4 General workshop rules and regulations	Rules, unsafe behaviours, PPE
4	1.4 General workshop rules and regulations	Safety signs, PPE and safe work situations
5	2.1 Diagonal scale	Purpose, construction and applications
6	2.2 Loci	Definition, types and mechanism locus construction
7	2.3 Tangency; 2.4 Blending of lines and curves	Tangency methods and construction
8	3.1 Road wheels	Functions, tyre specifications/safety and maintenance
9	3.2 Motor vehicle body; 3.3 Motor vehicle chassis	Functions, types, frame sections and safety features
10	3.4 Motor vehicle body joining processes	Fasteners, riveting, joining and adhesives
11	4.1 Introduction to engines	Engine definition, uses, terminology and capacity calculation
12	4.2 Classifications of engines; 4.3 Types of engines	Classification methods, combustion process and fuel type
13	4.4 Engine components	Components and functions

FIGURE / IMAGE PROMPT GUIDE

- Figure 1 — Power mechanics workshop layout with work benches, machine area, store, exit and safe walkway.
- Figure 2 — Diagonal scale construction.
- Figure 3 — Locus of a point on a simple mechanism.
- Figure 4 — Tangent to a circle.
- Figure 5 — Motor vehicle tyre with tread and sidewall.
- Figure 6 — Simplified motor vehicle chassis/frame.
- Figure 7 — Internal-combustion engine components.

TOTAL: 100 MARKS